

## BRIEFER ARTICLES

### CHARACTERS OF PINUS: THE LATERAL CONE

(WITH TWO FIGURES)

In *Trees and Shrubs* (1:209. 1905), under *Pinus Altamirani*, attention is called to the variation in the position of the young cone as follows: "Like some other Mexican pines with normally subterminal cones, it sometimes produces double nodes and lateral cones and pseudo-lateral young cones occasioned by a short incomplete midsummer growth." The three possible positions of the young cone are here found in the same species, and suggest the investigation of characters which have been considered by some authors to be of weighty significance in the determination not only of species but of comprehensive sections of the genus.

In comparing the winter bud of *Pinus Strobus* with that of *P. rigida* or *P. Banksiana* (*divaricata*), two distinct forms are seen, the former predicting a single internode for the shoot of the following spring, the latter two or more. A *uninodal* shoot, when developed, consists of a shorter leafless base (which bears the staminate flowers when they are present) and a longer portion bearing the foliage and terminating in a node of buds, a *terminal* bud, and a verticillate group of *subterminal* buds about its base. A *multinodal* shoot, in addition to this, comprises one or more inner internodes, each clearly defined by a leafless base at one end and a node of lateral buds at the other (*fig. 1*). The pistillate flower, the future cone, takes the place of one of the subterminal or lateral buds. On uninodal shoots its position is necessarily subterminal; on multinodal shoots it may be either subterminal or lateral or both, even on the same shoot.



FIG. 1



Evidently the characters implied in the "subterminal and lateral cones" of authors would have a wider application and a more accurate significance if expressed in terms of the uninodal and multinodal vernal shoots, since these last characters are present on young or sterile as well as on fertile trees, while the lateral and subterminal conelets often coexist on the same branch. "Subterminal cone" is an unfortunate term. No distinction has been made by authors between the immature cone of the first season, which may be either subterminal or lateral, and the ripe cone of the following season when it is invariably and inevitably lateral; therefore "conelet," proposed by MOHR exclusively for the cone of the first year, will be used here.



FIG. 2

After the vernal growth is clearly defined and the flowers have been pollinated, it often happens that a summer growth takes place that was not apparent in the winter bud. This growth, in the summer, differs from the spring growth not only in its less development but also in its *green* bracts, which, not being required for the protection of the winter bud, assume more or less completely the size, color, and character of the primary leaf; and at the end of the season, when the bracts have withered or fallen away, this summer shoot can be recognized by its shorter leaves. This growth, of course, does not affect the status of those conelets whose lateral position has been established already on the spring growth, but it reduces subterminal conelets to a quasi-

lateral position and converts a uninodal into an imperfect multinodal shoot.

This summer growth is quite common and may occur on any pine. On most species it is merely sporadic, appearing here and there on vigorous branches, more commonly on younger than on older trees; on a few species it is usual and characteristic, at least in youth. Of these latter *P. Bungeana*, the Chinese nut pine, is a very perfect example, and its hardiness in this latitude offers an excellent opportunity for the study of this peculiarity (*fig. 2*). The three positions of the conelet, corresponding to the uninodal, multinodal, and summer shoots, may be conveniently distinguished respectively as subterminal, lateral, and pseudo-lateral conelets.



They have been described, to avoid ambiguity, without qualification and without considering the variations and exceptions that arise from the complex influences, internal and external, temporary or permanent, that may modify the development of the annual growth. As a matter of fact, while the characters under consideration may be potential in a species, they are not always invariable or consistent.

A multinodal shoot, at the lateral nodes, may put out conelets or branchlets or both; either may be absent or be represented by a bud which may or may not develop the following year; or there may be nothing whatever to indicate the lateral node except the leafless base of the internode beyond. Again, the winter bud is an incipient branchlet, the beginnings of a growth to be continued in the spring; the degree to which the bud is developed, at the end of the summer, is subject to the vicissitudes of all growth. The bud destined to produce a multinodal shoot may be so far advanced as to show its purpose at a glance, or its future development may be latent and concealed to a greater or less degree. Multinodal pines often produce uninodal shoots, and this apparent inconsistency becomes more frequent with increasing age, so that individuals of *P. rigida*, and allied species, may be found which are nearly or absolutely uninodal. Uninodal pines, on the contrary, are more constant. The summer shoot, however, may occur on any species, and may show in autumn various degrees of development which may amount to no more than a slight elongation of the bud or may form a conspicuous tuft of leaves on the end of the branchlet. From its very nature the summer shoot must be regarded as evidence of local or temporary vigor rather than as a specific character, and this is true even of those pines where the development of the summer shoot has almost diagnostic value. *P. Bungeana* and *P. Gerardiana* are credited by authors with "lateral cones" on account of the persistency of this summer growth; but specimens in the herbaria at Kew, Paris, and the Arnold Arboretum show conclusively that their pseudo-lateral conelets partly or completely disappear in mature trees.

Taking the genus as a whole, there seems to be every gradation between the two extremes, the conelet exclusively lateral and the conelet exclusively subterminal. These considerations point to the conclusion that the difference implied in the "subterminal and lateral cones" of authors is one of degree rather than of kind, and however valuable the lateral conelet may be, when it is present, for the determination of species, it is not available, on account of its inconstancy, for broader classifications. It is therefore evident that a herbarium specimen, so far as it shows these characters, may not represent the normal behavior of a species, and such a specimen



may be misleading. In *Jour. Linn. Soc.* (35:601) "a specimen of *P. Montezumae* containing leaves 12-14 inches long and others 5 inches long on the same branch" is cited as if it were unusual. It is evidently the arrested growth of a summer shoot that bears the shorter leaves.

In *Bull. Torr. Bot. Club* (30:108), *Pinus cubensis anomala* Rowlee, a new variety, is described with "bracts 8<sup>mm</sup> long, green on the young shoot," and further on, "the reversion of the scales to what is generally considered the primitive form of the primary leaf of the pine is an exceedingly interesting phenomenon." This again, as the specimen shows, is the summer shoot in its usual form, and its counterpart has been observed in a great number of species.

*P. teocote* Sch. and Deppe, is described as a pine with a lateral cone. The summer growth, which is quite frequent on this species, as well as on other Mexican pines, is responsible for this error, as the species bears normally subterminal conelets.

*P. contorta* is placed in ENGELMANN'S *Revision of the genus Pinus* (*Trans. St. Louis Acad.* 4:177) in his section PONDEROSAE, though not without hesitation (l. c. 182), on account of its subterminal cone. It is nevertheless a true multinodal pine, bearing cones on both lateral and terminal nodes.

In his recent work *Wald- und Parkbäume* (1906) HEINRICH MAYR makes a distinction between true and false nodes (*echte Quirle* and *Scheinquirle*), which may be recognized respectively by the presence or absence of bud scales; "subterminal and lateral cones" are explained in terms of these nodes. His sections PINASTER and JEFFREYA produce cones at the true nodes, his section MURRAYA at the false nodes. Apparently these characters are held to be invariable, and no allowance is made for the appearance of cones at both forms of the nodes on the same species. Only on this supposition can the anomalies that appear in MAYR'S classification of the pitch pines be explained.

*Pinus rigida* is in his section MURRAYA; while *P. serotina*, which does not differ from *P. rigida* in the characters under consideration, is in his section JEFFREYA. *P. halepensis* is in PINASTER, while *P. Brutia* is in MURRAYA. *P. Sabiniana*, *P. Coulteri*, and *P. caribaea* which, so far as they are affected by these characters, belong in MURRAYA, are all in JEFFREYA. These inconsistencies may all be laid to specimens which happen to bear subterminal conelets instead of the characteristic lateral ones. *P. chihuahuana*, which requires three years in which to perfect its cone, is found in the section MURRAYA. Here his distinction between true and false nodes, if it is reliable, should have prevented MAYR from mistaking the conelet



of the second year for a lateral conelet. The species is uninodal and bears subterminal conelets.

It is not the purpose of this article to discuss the merits of MAYR's very interesting arrangement of *Pinus* except so far as it involves the false node and its cone, on which his section *MURRAYA* is mainly founded. It serves to illustrate, however, the elusive character of the "lateral cone," which should be regarded as an incident, more or less persistent, in the life of a pine, rather than as an invariable character.—GEORGE RUSSELL SHAW, *Arnold Arboretum, Jamaica Plain, Mass.*

## THE GENUS *ALISMA* IN NORTH DAKOTA

(WITH ONE FIGURE)

As the basis for this investigation I have used BUCHENAU's monograph.<sup>1</sup> According to his analytical key, *Echinodorus* has 6, 9, 12, or more stamens, and the carpels are arranged in a dense head; while *Alisma* is characterized by 6 stamens, and has the carpels placed in a circle. Consequently he has changed the name *Alisma tenellum* Martius to *Echinodorus tenellus* (Mart.) Buchenau. He refers all the other forms of *Alisma* to *A. Plantago* L. and has divided this species into three varieties: var.  $\alpha$  *Michaletii* Aschers. et Graebn.; var.  $\beta$  *arcuatum* (Michalet) Buchenau; and var.  $\gamma$  *parviflorum* (Pursh) Torr. He says that var. *arcuatum* "is distinguished by many special small characters" from the other varieties. As will be found below, some of these differences are most conspicuous and give to the plant a peculiar aspect, and the distinguishing characters are constant and extend to all parts of the plant. I have therefore restored this variety to its former specific rank, and believe that the following will be an acceptable synopsis:

1. Pedicels forming with the scape an angle of  $45^{\circ}$  or less; styles erect, longer than the ovules . . . . . *A. Plantago (aquatica)* L.

2. Pedicels forming with the scape an angle of  $90^{\circ}$  or more; styles bent outwards in a hook, shorter than the ovules . . . . . *A. arcuatum* Michalet.

1. *ALISMA PLANTAGO* L., *vide* Engler's *Pflanzenreich*, l. c.—Scapes generally solitary (seldom two), 15–100<sup>cm</sup> high, erect; strong, slender, fibrous, as is the whole plant, except when very young. Leaves bright green, ovate to lanceolate, with an acute apex and a rounded or cordate sometimes tapering base; petioles 2–35<sup>cm</sup> long; the blades usually 7-ribbed, 5–17<sup>cm</sup> long, 3–9<sup>cm</sup> wide. Inflorescence a strict, large, loose, pyramidal panicle of majestic appearance, its lower part raised above the level of the leaf

<sup>1</sup> BUCHENAU, FR., *Alismataceae*. Engler's *Pflanzenreich* 4: no. 15. pp. 66. 1903.